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INTERMOUNTAIN FOREST AND RANGE EXPERIMENT STATION
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BIOLOGICAL EVALUATION OF MOUNTAIN PINE BEETLE INFESTATIONS IN THE ST. JOE NATIONAL FOREST, IDAHO 1958

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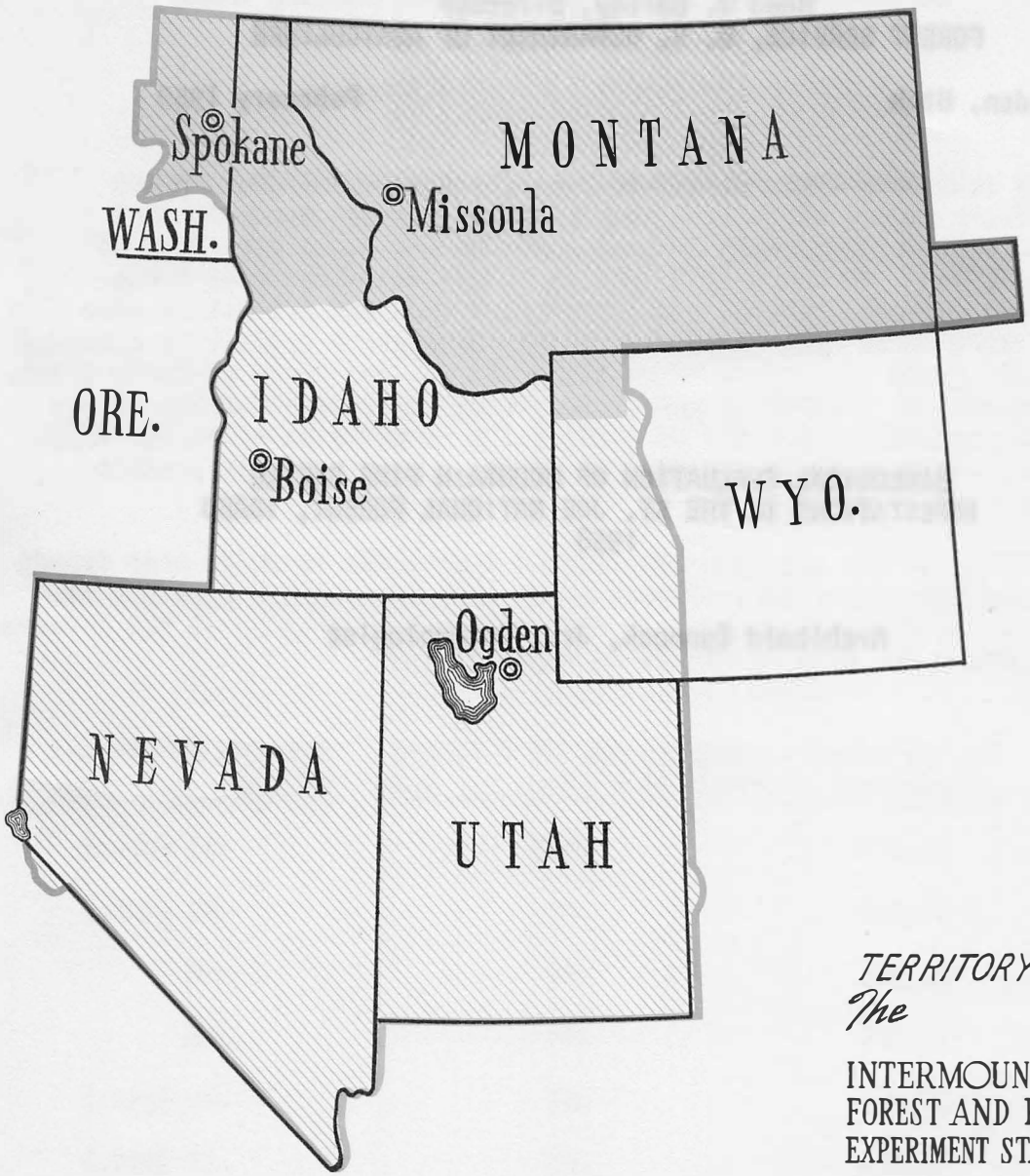
Prepared by the
Missoula Forest Insect Laboratory
Missoula, Montana

The AREA COVERED BY THIS REPORT



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INTERMOUNTAIN FOREST AND RANGE EXPERIMENT STATION

The MISSOULA FOREST INSECT LABORATORY is a field unit of the Intermountain Forest and Range Experiment Station at Ogden, Utah. The Laboratory conducts forest insect research, surveys forest insect outbreaks, and gives technical advice on cooperative insect control programs in Montana, northwestern South Dakota, northwestern Wyoming, northern Idaho, and northeastern Washington.

The functions are conducted in the remaining station territory by staff entomologists at Ogden, and Boise, Idaho.

BIOLOGICAL EVALUATION OF MOUNTAIN PINE BEETLE INFESTATIONS IN THE ST. JOE NATIONAL FOREST, IDAHO 1958

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During September 1958, personnel from the Missoula Forest Insect Laboratory made a biological evaluation of current mountain pine beetle infestations along a portion of the St. Joe River, east of Avery, Idaho. In August 1958 groups of western white pine trees infested with the beetles had been mapped from the air within this 2,500-acre area. The boundaries of the biological evaluation extended from the mouth of Sisters Creek along the St. Joe River to Malin Creek. The purpose of this study was to determine the present status of the beetle population in order to predict the infestation trend for 1959. The evaluation also furnished data on the severity of the present infestation.

The status of the mountain pine beetle population in white pine stands has been kept under surveillance since 1934 on numerous portions of the St. Joe National Forest. A chronological tabulation of the infestation within the area evaluated in 1958 follows:

Year	No. of acres surveyed	Average no. of infested white pine trees per acre	Average percentage of stand infested
1934	54,000	.005	.03 (est.)
1935	54,000	.02	.06 (est.)
1937	21,700	.01	.06
1941	21,700	.02	.06
1948	30,350	.07	.40 (est.)
1949	2,800	.04	.27 (est.)
1951	11,100	.04 (est.)	.26

From 1951 through 1957 no surveys were made by the Laboratory to detect or evaluate mountain pine beetle infestations in the St. Joe National Forest. The above tabulation indicates the beetle population has been at a very low endemic level since 1934.

METHODS

The infestation in the St. Joe River area was evaluated by randomly walking through white pine stands suspected of harboring mountain pine beetle infested trees. Host trees were tallied as uninfested or infested. Trees injured prior to attack by the beetles were recorded as being injured by diseases or mechanically (table 1). The most common disease was top-kill by white pine blister rust, Cronartium ribicola Fischer. Mechanical injuries included logging wounds, broken tops, lightning, etc. Injuries were noted to determine if the beetles are attracted to weakened or dying white pine trees. Bark samples, 6 x 12 inches, were removed from four sides of an infested tree at breast height. Under each bark sample totals were kept of all stages of brood found and the number of attacks.

In 1939, Bedard and Terrell[1/] developed a formula for predicting infestation trends of mountain pine beetles in white pine stands. This formula was applied to the 1958 brood counts.

The basis for the formula follows:

$\frac{(B)\ 0.75}{A} \times V =$ Biological index or ratio of increase or decrease of infested trees

Key:

B = the amount of mountain pine beetle brood corrected for basal examination and anticipated mortality

0.75 = constant correction for sex ratio and flight mortality

A = attacks per square foot corrected for basal examinations (usually more attacks in base)

V = value given infested tree on basis of whether it is average, below, above, or well above average size.

RESULTS

Table 2 indicates that the average biological index for the Avery District is 2.3. The index implies that for every tree attacked in 1958, 2.3 trees of that size will be attacked by the mountain pine beetle in 1959. Heavy and vigorous broods were observed during 1958 in attacked

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1/ Bedard, W. D., and Terrell, T. T. 1939. A method for predicting the trend of mountain pine beetle infestations in western white pine. Unpublished report of the Coeur d'Alene Forest Insect Laboratory, Bureau of Entomology and Plant Quarantine, U.S.D.A., Coeur d'Alene, Idaho.

trees on Bird Creek, and a high index of 3.4 warns that this drainage should be checked in 1959. A group of 20 infested white pines were checked 3/10 of a mile west from Bottle Creek along the Avery road and 100 yards north along a skid trail. This isolated infestation has probably been spreading in area for the past 10 or more years. Dead beetle-killed trees, of this age, remain in its perimeter. The currently-attacked trees could be easily logged out of the stand. This act would help to slow down or curb the infestation's spread.

Out of 3,157 white pine trees examined, 1.1 percent were infested with mountain pine beetles (table 2). Of the infested trees, 57.1 percent were injured prior to attack by blister rust (table 1), but only 2.8 percent had mechanical injuries. No conclusion can be drawn that the mountain pine beetles seek out injured white pine trees from these data. Although 60 percent of the trees were injured before being attacked, this figure is not significantly high enough when it is considered that 64 percent of the white pine trees on the St. Joe National Forest are reported by foresters to have lethal infections of blister rust.

DISCUSSION

Past experience has indicated that in mature white pine stands mountain pine beetle infestations fluctuate from year to year. The number of trees infested in these stands can vary from 0.5 to 3.0 percent annually. The current 1.1 percent infestation along the St. Joe River, east of Avery, Idaho, then, may not be abnormal. The infestation probably could be retarded or decreased by logging out beetle-infested pine trees before the spring emergence of attacking adults. Any substantial increase of the beetle population should be watched for. Further biological evaluations will aid in predicting this trend.

Natural control factors may decrease the mountain pine beetle population in this area. A collection of parent adult beetles suspected of being diseased was sent to Dr. C. L. Massey of the Forest Insect and Disease Laboratory[2/], Albuquerque, New Mexico. The insects were found to be heavily infested with an endoparasitic nematode, Aphelenchulus reversus Thorne. Of the female beetles examined, 53 percent were infested with the nematode. Massey stated that this particular parasite seriously affects the egg laying capacity of infested female beetles. If this level of parasitism extends over the entire area Massey feels that the effect of the nematodes may become noticeable within a year or so.

2/ Rocky Mountain Forest and Range Experiment Station

Table 1.--Percentage of infested white pine trees injured prior to attack by mountain pine beetle, 1958

Area surveyed	Total number of infested trees	Uninjured trees		Injured trees			
				Mechanically*		Blister rust	
		Number	Percentage	Number	Percentage	Number	Percentage
Bird Creek	11	4	36.4	-	-	7	63.6
Bottle Creek	24	10	41.7	1	4.2	13	54.2
Total	35	14		1		20	
Average			40.0		2.8		57.1

* Trees were injured by broken tops, logging, lightning, etc.

Table 2.--Biological evaluation of mountain pine beetle infestations within the Avery District, 1958

Area surveyed	No. of noninfested white pine trees	No. of currently infested white pine trees	Percentage of infested trees	Biological index*
Bird Creek	505	11	2.1	3.4
Bottle Creek	1,137	24	2.1	1.8
Tourist-Prospector Creek	1,515	0	-	-
Total	3,157	35		
Average			1.1	2.3

* The biological index figure is a ratio of increase or decrease in the number of expected infested trees for the next year.